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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S6 (R, S) / S6 (PT) (R) Examination June 2023 (2019 Scheme)



Course Code: CET306

Course Name: DESIGN OF HYDRAULIC STRUCTURES

Max. Marks: 100

Duration: 3 Hours

- Use of Khosla's Chart, Blench Curves, and Montague Curves are permitted in the Examination Hall
- Assume suitable design data whichever is necessary

**PART A**

*Answer one full question from each module, each carries 15 marks.*

Marks

**Module I**

- 1 a) Distinguish between Bligh's theory and Khosla's theory. (9)
- b) What are the functions of the fish ladder and divide walls in Diversion head works? (6)

**OR**

- 2 a) Explain Khosla's method of Independent variables. How will you apply different types of corrections in design of impervious floor of hydraulic structures using Khosla's theory (12)
- b) Explain piping failure of hydraulic structures and state remedial measures (3)

**Module II**

- 3 a) Draw the section of the unlined canal partly in cutting and partly in filling. (5)
- b) What is a Cross Drainage work? Explain the types of Cross drainage work. (10)

**OR**

- 4 a) What are Canal falls? Explain any four types of Canal falls with sketches (9)
- b) Compare Kennedy's theory and Lacey's theory (6)

**PART B**

*Answer any one full question*

**Module III**

- 5 a) Design a suitable cross-drainage work for the following hydraulic particulars: (25)

**Canal**

Full supply discharge = 50 cumecs

Bed width = 24.0m

Bed level = 200.000

Full supply depth = 1.25m

Side slope = 1.5 H : 1 V

Left bank is 3.0 m wide. Right bank is 4.5m wide and the cross drainage work carries a roadway of 4.5m over it.

**Drainage**

Maximum flood discharge = 500 cumecs

Bed level = 198.000

High flood level = 200.50m

General ground level = 200.00m

Lacey's silt factor = 1

Rugosity coefficient  $N = 0.016$

- b) Prepare the following drawings (not to scale)
- i. Half-sectional plan at the foundation level (15)
  - ii. Section along the center line of the drain (10)

**OR**

- 6 a) Design a 1.5 m Sarda fall for a canal having a discharge of 15 cumecs for the following data (25)
- Bed level upstream = 108.0 m
  - Side slopes of channel = 1:1
  - Bed level downstream = 105.5 m
  - Full supply level upstream = 109.5 m
  - Bed width u/s and d/s = 10 m
  - Soil is Good loam
  - Khosla's safe exit gradient =  $1/6$
- b) Prepare the following drawings (not to scale)
- i. Half-sectional plan at the foundation level (15)
  - ii. Section along the center line of the canal (10)

**PART C**

**Answer one full question from each module, each question carries 10 marks**

**Module IV**

- 7 a) What are the functions of galleries in dams? (6)
- b) What is the Limiting height of a gravity dam? (4)

**OR**

- 8 a) Check the stability of the gravity dam for the following data. Top width = 5m, (10)  
freeboard = 3m, u/s FRL depth = 60m, u/s batter = 1/10, d/s slope = 0.7H to 1V,  
u/s remains vertical to a depth of 12m from the top. There is no tail water and silt.

**Module V**

- 9 a) What is a Stilling basin? Explain Type I and Type II stilling basins. (7)  
b) Explain the thin cylinder method of design of the Arch dam. (3)

**OR**

- 10 a) Explain the features of Ogee type spillway. (4)  
b) Explain in detail the design criteria of an earth dam. (6)

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